## Remarks/Arguments

Reconsideration and allowance of this application are respectfully requested. Currently, claims 3-7, 10-17 and 21-28 are pending in this application.

**Claim Objections:**

Claims 3-7, 10-17, 21-22 and 25 have been objected to because of informalities. The claims have been amended to overcome these informalities, including adoption of helpful suggestions provided by the Office Action. Applicant submits, for example, that the terms identified by the Office Action have a proper antecedent basis. Applicant therefore requests that the objection to the claims be withdrawn.

**Rejection under 35 U.S.C. §103:**

Claims 3-4, 7, 10-12, 15-16 and 23-24 have been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Nielsen et al. (U.S. '451, hereinafter "Nielsen") in view of Sasaki et al. (U.S. '623, hereinafter "Sasaki"), and further in view of Mitzenmacher (U.S. '036, hereinafter "Mitzenmacher"). Applicant traverses this rejection.

The combination of Nielsen, Sasaki and Mitzenmacher fails to teach or suggest all of the claim limitations. For example, the combination Nielsen, Sasaki and Mitzenmacher fails to teach or suggest "processing the data in the received plurality of data files by aggregating those of the received data files having a common predetermined expiry time to create a plurality of aggregated compressed data files, and...wherein the compression and aggregation technique applied to the data is a Bloom filter process, and wherein each individual aggregated compressed data file has a predetermined expiry time which is equal to the common predetermined expiry time of the received data files included in that individual aggregated compressed data file, and

*wherein the aggregated compressed data files are only forwarded if they have not exceeded their predetermined expiry time* (emphasis added)" as required by independent claim 3 and its dependents. Similar comments apply to independent claim 10 and its dependents.

Mitzenmacher and Sasaki are cited as examples of compressed and "Bloom filter" data files. The Office Action seeks to apply the principles of Nielsen to data conveyed in such files. However, *combining data in the form of Bloom filters is incompatible with the teachings of Nielsen* – as will be discussed in more detail below. Furthermore, even if one skilled in the art were to apply the teachings of Nielsen to Sasaki's and/or Mitzenmacher's data, the result would not have taught or suggested all of the limitations of the independent claims.

Nielsen assembles individual files into a data "cell", for transmission to a given destination, either when the cell is full (a maximum number of files have been accumulated) or, even if the cell is not full, when an expiry time common to all the files in the cell has been reached. This provides a compromise between delay and wasted capacity (see paragraphs [0026]-[0028], [0047], [0049], [0063]).

Nielsen's data files are only forwarded when the expiry time of their ATM cell has been reached. For example, Nielsen's Abstract states "*Upon the expiry time for a group of data streams being reached* the partially-filled cells for the data streams in the group are sent (emphasis added)."

In direct contrast to Nielsen's teaching of "*Upon the expiry time for a group of data streams being reached* the partially-filled cells for the data streams in the group are sent (emphasis added)", independent claim 3 requires "aggregated compressed data files *are only forwarded if they have* ***not exceeded*** *their predetermined expiry time* (emphasis added)."

In the invention of independent claim 3 (similarly for independent claims 10 and 17), each data item is aggregated into a file, and forwarded to other nodes (with further data then added at the further node if that node has any data to add). However, unlike Nielsen, the invention of claim 3 does not wait for an expiry time to be reached. Again, claim 3 requires that "the aggregated compressed data files are only forwarded if they have ***not exceeded*** their expiry time (emphasis added)." That is, aggregated compressed data file is forwarded unless the expiry time has been reached. Consequently, it can be forwarded several times before that expiry time is reached. The expiry time in the invention of claim 3 (and claims 10 and 17) remains associated with the forwarded data, and continues to run as the data is forwarded. In contrast, each node in Nielsen sets a new expiry time for the data it is waiting to forward.

Nielsen will forward an ATM cell before its expiry time if it is "full", but the requirement in the present claims for the data files to be Bloom filters means that they can never be said to be "full". The addition of more data to a Bloom filter merely increases the probability of a "false positive", as described on page 8 of Applicant's orginal specification, and thus an aggregated data file in the form of a Bloom filter can never be said to be "filled" or "partially filled". This *teaches away* from combining the teachings of Mitzenmacher (the use of Bloom filters) with Nielsen (the idea of treating filled and partially-filled data cells differently).

If one skilled in the art looking to operate a system for improving the operation of a system for managing compressed Bloom filter files were to read Nielsen, then he/she would almost immediately dismiss it as irrelevant on the basis of paragraph [0002]. This paragraph states specifically that the reference is concerned with "fixed-length" data cells, and thus would lead one skilled in the art to conclude that it would not be relevant to the management of Bloom filter data.

Moreover, Nielsen teaches that latency is to be minimized (paragraph [0005]) and that this can be achieved by logging the time of first placing data in an ATM cell, and sending all the data in the cell (including any that has been placed there subsequently) when a specified interval has elapsed from that initial time (paragraph [0005]) – or when the cell is full if that occurs sooner. Nielsen is concerned with simplifying the forwarding process by identifying cells having the same expiry time (but different destinations) and running one timer for all of them. This approach would not be consistent with respect to the claimed invention.

The present invention requires each data *file* to have a *respective* expiry time, and aggregating any received data files *having a common expiry time* into a single file. In Nielsen, there is no expiry time associated with the individual data items. Instead, it is Nielsen's ATM cells themselves which have expiry times, and these are determined by the time at which the first data item is/was added to the cell (paragraph [0005]). All the data items in one of Nielsen's cells will thus be associated with the same expiry time, regardless of when they were added to the cell, but only because the expiry time applies to the cell to which they have been allocated. This is quite different from the requirement of the present claims that data files are aggregated together according to an expiry time whose association with the data file pre-exists the aggregation process (namely, "receiving a plurality of data files at a relay device, each of the data files having a respective predetermined expiry time (emphasis added)"). At the time of receipt, one of Nielsen's data files does not have an expiry time – it only acquires one in consequence of being allocated to an ATM cell.

In claim 3, the allocation of data to an aggregated file is done according to its pre-existing expiry time. In Nielsen, the expiry time is determined according to the ATM cell to which it is allocated.

Nielsen does describe a common handling process for ATM cells having the same expiry time (paragraph [0008]) by associating together any destinations for which the partially filled ATM cells have a common expiry time. However, it is clear that each destination has (at most) one partially-filled ATM cell at any one time and thus each such ATM cell has a different destination. Consequently, any ATM cells having a common expiry time cannot have been aggregated as required by the present claims as they are for different destinations. In particular, they could not be aggregated by a Bloom filter process, since such data aggregation processes do not allow disaggregation. As described in Applicant's original specification, a Bloom filter allows one to detect whether a certain data item is present, but does not allow deletion of individual items (or disaggregation) without corrupting other data.

Claim 10 specifically requires that the transmitter selects a plurality of similar relay devices and transmits the data messages to those devices (plural) as a broadcast using a "publisher forwarding scheme." The data files are thus not associated with a specific destination. Indeed, each relay device transmits the data files to several others. Nielsen selects data according to its destination, and assembles an ATM cell for each such destination. Again, this teaches away from claim 10 which sends the same data to several other relays.

Each of the independent claims requires "*broadcasting* each aggregated compressed data file (emphasis added)" or the like. Each file, with its associated expiry time, is therefore not associated with a specified destination -- unlike the case with Nielsen. This is confirmed explicitly by new dependent claims 26-28.

Claims 5-6 and 13-14 have been rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over the *four*-way combination of Nielsen, Sasaki, Mitzenmacher, and further in view of Van Renesse (U.S. '967). Claims 17, 21-22 and 25 have been rejected under 35 U.S.C.

§103(a) as allegedly being unpatentable over the three-way combination of Van Renesse in view of Nielsen, and further in view of Mitzenmacher. Van Renesse fails to resolve the above described deficiencies with respect to the base independent claims. Applicant therefore requests that the rejections under 35 U.S.C. §103 be withdrawn.

**Conclusion**:

Applicant believes that this entire application is in condition for allowance and respectfully requests a notice to this effect. If the Examiner has any questions or believes that an interview would further prosecution of this application, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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